

CLAIMS

WHAT IS CLAIMED IS:

- 1 1. A method of determining network routing information based on shared risk link group information in a data communications network comprising nodes and links, the method comprising the computer-implemented steps of:
 - 4 receiving information identifying a failed link in the network;
 - 5 receiving information defining one or more shared risk link groups to which the failed link belongs;
 - 7 accessing a link state database that stores information defining one or more links and adjacent nodes;
 - 9 determining whether each link defined in the link state database is in the one or more shared risk link groups; and
 - 11 removing an adjacent node from the link state database for any link that is determined to be in one of the shared risk link groups.
- 1 2. A method as recited in claim 1, performed as part of determining a shortest path through the network from a source to a destination.
- 1 3. A method as recited in claim 1, further comprising the steps of:
 - 2 determining whether a graph of the data communications network based on the link state database is disconnected; and
 - 4 if the graph is disconnected, then determining a new shortest path through the network to a destination network element without removing any link that has not been explicitly reported by another network element as failed.
- 1 4. A method according to any of Claim 1, 2, or 3, further comprising the steps of:
 - 2 initiating a timer prior to the accessing step;
 - 3 when the timer expires, determining a new shortest path through the network to a destination network element.

1 5. A method of determining network routing information based on shared risk link
2 group information in a data communications network comprising nodes and links, the
3 method comprising the steps of:
4 receiving information identifying a failed link in the network;
5 receiving information defining one or more shared risk link groups S to which the
6 failed link belongs;
7 during computation of a shortest path first tree, after having added a node X to a path,
8 adding each neighbor Ni of node X to a tentative tree if and only if a link (X,
9 Ni) does not belong to S.

1 6. A method of determining network routing information based on shared risk link
2 group information in a data communications network comprising nodes and links, the
3 method comprising the steps of:
4 receiving information identifying a failed link in the network;
5 receiving information defining one or more shared risk link groups to which the failed
6 link belongs;
7 initiating computation of a shortest path first tree;
8 adding a first node to a path as part of the computation;
9 determining a set of neighbors of the first node; and
10 adding each neighbor node to a tentative tree if and only if a link between the first
11 node and the neighbor node does not belong to one of the shared risk link
12 groups.

1 7. A method as recited in claim 6, further comprising the steps of:
2 determining whether a graph representing the data communications network is
3 disconnected; and
4 if the graph is disconnected, then determining a new shortest path through the
5 network to a destination network element without removing any link that has
6 not been explicitly reported by another network element as failed.

1 8. A method according to any of Claim 6 or 7, further comprising the steps of:
2 initiating a timer prior to the accessing step;
3 when the timer expires, determining a new shortest path through the network to a
4 destination network element.

1 9. A computer readable medium comprising one or more sequences of instructions for
2 determining network routing information based on shared risk link group information in a
3 data communications network comprising nodes and links in a data communications network
4 having as elements links and nodes, which instructions, when executed by one or more
5 processors, cause the one or more processors to perform the steps of the method of any of
6 Claims 1, 2, or 3.

1 10. A computer readable medium comprising one or more sequences of instructions for
2 determining network routing information based on shared risk link group information in a
3 data communications network comprising nodes and links in a data communications network
4 having as elements links and nodes, which instructions, when executed by one or more
5 processors, cause the one or more processors to perform the steps of the method of any of
6 Claims 5, 6, or 7.

1 11. An apparatus for generating routing information based on shared risk link group
2 information in a data communications network having as elements nodes and links,
3 comprising:
1 means for receiving information identifying a failed link in the network;
2 means for receiving information defining one or more shared risk link groups to
3 which the failed link belongs;
4 means for accessing a link state database that stores information defining one or more
5 links and adjacent nodes;
6 means for determining whether each link defined in the link state database is in the
7 one or more shared risk link groups; and

8 means for removing an adjacent node from the link state database for any link that is
9 determined to be in one of the shared risk link groups.

1 12. An apparatus as recited in claim 11, implemented as part of a means for determining a
2 shortest path through the network from a source to a destination.

1 13. An apparatus as recited in claim 11, further comprising:
2 means for determining whether a graph of the data communications network based on
3 the link state database is disconnected; and
4 means for determining, if the graph is disconnected, a new shortest path through the
5 network to a destination network element without removing any link that has
6 not been explicitly reported by another network element as failed.

1 14. An apparatus according to any of Claims 11, 12, or 13, further comprising:
2 means for initiating a timer prior to the accessing step;
3 means for determining, when the timer expires, a new shortest path through the
4 network to a destination network element.

1 15. An apparatus for determining network routing information based on shared risk link
2 group information in a data communications network comprising nodes and links, the
3 apparatus comprising:
4 means for receiving information identifying a failed link in the network;
5 means for receiving information defining one or more shared risk link groups S to
6 which the failed link belongs;
7 means for adding, during computation of a shortest path first tree, after having added
8 a node X to a path, each neighbor Ni of node X to a tentative tree if and only
9 if a link (X, Ni) does not belong to S.

1 16. An apparatus for determining network routing information based on shared risk link
2 group information in a data communications network comprising nodes and links, the
3 apparatus comprising:
4 means for receiving information identifying a failed link in the network;
5 means for receiving information defining one or more shared risk link groups to
6 which the failed link belongs;
7 means for initiating computation of a shortest path first tree;
8 means for adding a first node to a path as part of the computation;
9 means for determining a set of neighbors of the first node; and
10 means for adding each neighbor node to a tentative tree if and only if a link between
11 the first node and the neighbor node does not belong to one of the shared risk
12 link groups.

1 17. An apparatus as recited in claim 16, further comprising:
2 means for determining whether a graph representing the data communications
3 network is disconnected; and
4 means for determining, if the graph is disconnected, a new shortest path through the
5 network to a destination network element without removing any link that has
6 not been explicitly reported by another network element as failed.

1 18. An apparatus according to any of Claims 16 or 17, further comprising:
2 means for initiating a timer prior to the accessing step;
3 means for determining, when the timer expires, a new shortest path through the
4 network to a destination network element.

1 19. An apparatus for generating routing information in a data communications network
2 having as elements links and nodes, the apparatus comprising:
3 one or more processors;
4 a network interface communicatively coupled to the processor and configured to
5 communicate one or more packet flows among the processor and a network;
6 and
7 a computer readable medium comprising one or more sequences of instructions for
8 generating routing information which instructions, when executed by one
9 more processors, cause the one or more processors to perform the steps of the
10 method of any of claims 1, 2, or 3.

1 20. An apparatus for generating routing information in a data communications network
2 having as elements links and nodes, the apparatus comprising:
3 one or more processors;
4 a network interface communicatively coupled to the processor and configured to
5 communicate one or more packet flows among the processor and a network;
6 and
7 a computer readable medium comprising one or more sequences of instructions for
8 generating routing information which instructions, when executed by one
9 more processors, cause the one or more processors to perform the steps of the
10 method of any of claims 5, 6, or 7.